Northwest
Territories Bureau of Statistics

NWT Economic Multipliers
– Overview and Results –

NWT Bureau of Statistics
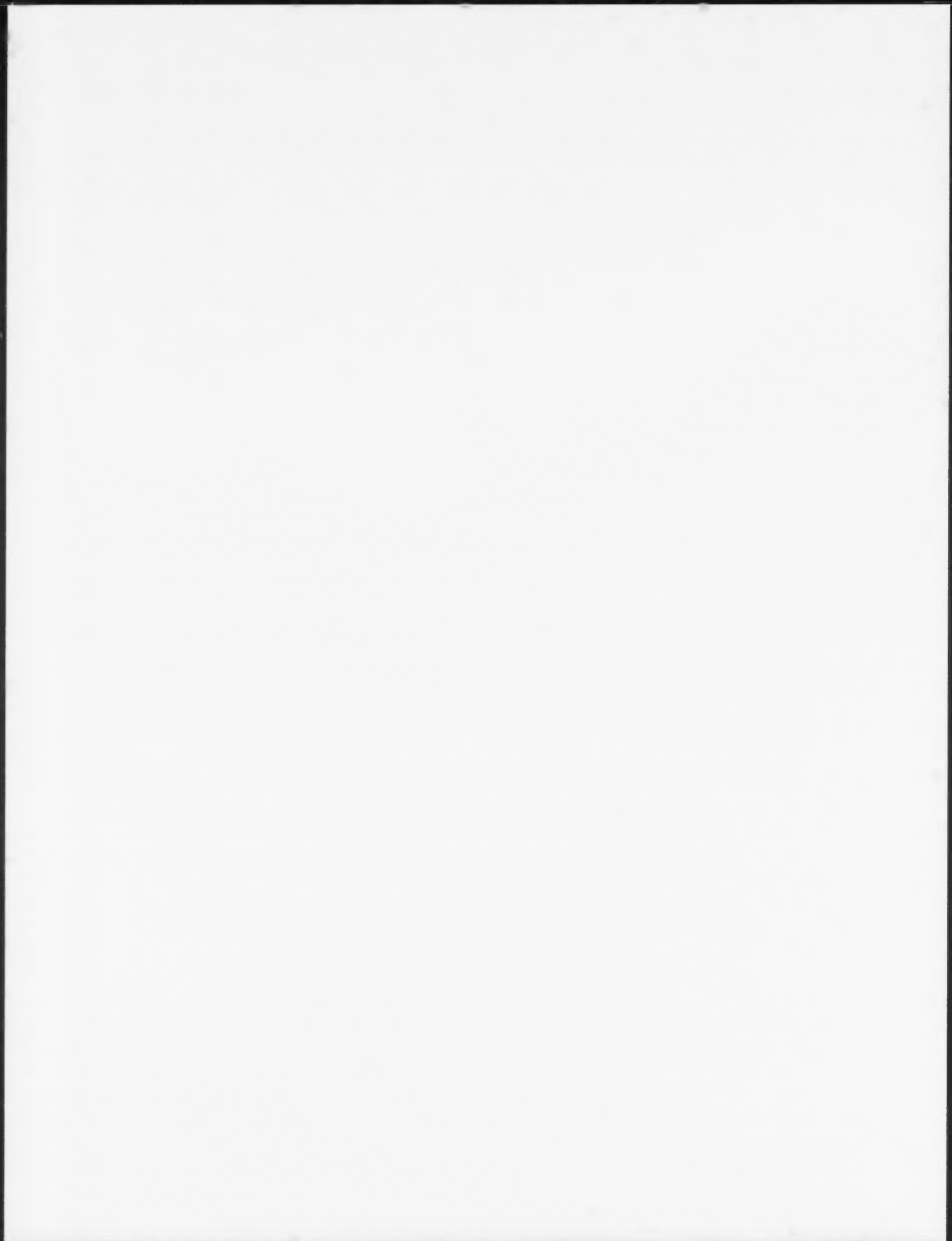Government of the Northwest Territories
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A. Introduction

The NWT Bureau of Statistics has maintained an input-output (IO) model since the early 1990's. The model is based on the same structure employed by Statistics Canada[1], and is updated periodically by the Bureau of Statistics using data from Statistics Canada. For an overview of the NWT IO model, see the document *NWT IO Model – Overview* on the Bureau of Statistics' website[2].

Starting in 1996, Statistics Canada began releasing updated IO information on an annual basis – the release in November 2011 provided 2008 IO information. The intention of the Bureau of Statistics is to update the multipliers in this document on an annual basis with each new release of IO information from Statistics Canada.

The economic multipliers in this document are an output of the NWT IO model, based on the 2008 IO tables, and are presented here at the medium level of detail, representing 41 industry aggregations.

B. Open and Closed Economic Multipliers

The open version of the Bureau of Statistics' input-output model provides estimates of direct and indirect economic effects on the territorial economy. Direct effects are the first round of impacts, the impact on those industries that expand production to satisfy the increased demand for a commodity. Indirect impacts result from backwards linkages in the economy, when the firms producing the commodity purchase additional inputs from other firms.

For the closed version of the input-output model, along with direct and indirect impacts, induced impacts are also estimated. Induced impacts result from the spending of increased household income that results from the change in economic activity. Closing an input-output model to households serves to increase the interdependence within the system and results in higher economic impacts compared to those in the open version.

Closed model, or induced, results are sometimes criticized for the potential to introduce bias, and the potential for overstatement in assessing economic impacts. Care must be taken when interpreting closed model results.

In part because of the above criticisms, Statistics Canada does not close the national or inter-provincial IO models, and does not produce closed multipliers. The Bureau of Statistics, while recognizing the potential for bias and the overstatement of impacts, also acknowledges the need to estimate induced impacts and therefore closes the NWT model. However, to limit the potential misuse and misunderstanding of the application of induced impacts in the absence of interpretation experience, closed multipliers are not published. Therefore, the multipliers presented in this publication are only provided in the open form – for direct and indirect impacts.

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[1] For a detailed description of IO model structural specifications, see Statistics Canada Technical Series [publication] #18-E: *Specification of Parameters for the National Input-Output Model*, December 1991.

[2] http://www.statsnwt.ca/economy/multipliers

C. Economic Multipliers (Intensity Ratios)

Economic multipliers are most commonly used to estimate the economic impacts associated with establishing a new firm in a particular industry or with the expansion, contraction or closure of existing firms.

When estimating economic impacts, it is preferable to use multipliers to make relative, rather than absolute, comparisons. Multipliers are more properly used to determine which of several activities would have the largest economic impact rather than to estimate the absolute level of economic impact for a single activity. Where multipliers are used to estimate the impacts of a single activity, the results should be treated only as a general estimates, indicating the order of magnitude of the impacts rather than exact levels. The economic multipliers presented in this report are expressed as intensity ratios.

Calculating Intensity Ratios

Intensity ratios are calculated by dividing the total (direct and indirect) economic impact due to some change in consumption or output, by the change in consumption or output. For example, if an industry increases its output by $2 million and this leads to an increase of $1.5 million in total territorial GDP, the GDP intensity ratio for that industry would be 0.75 (that is, $1.5 million / $2.0 million). Due to the significant leakages in the territorial economy (reliance on imports), territorial intensity ratios for industries are usually less than one.

Two important points to note when examining the intensity ratio table are that:

1. The GDP ratio is generally, but not always, a larger number than the labour income ratio. This is because labour income is a component of GDP. Estimates of GDP are largely comprised of three sub-components: Labour income, corporation profits before taxes, and Capital Consumption Allowance (i.e., depreciation), with the latter two grouped as a component referred to as 'surplus'. Therefore, the larger the (positive) difference between the GDP and Labour Income intensity ratios, the larger is the share of 'surplus' - i.e., profit and depreciation - for that industry.

2. The labour income intensity ration is lower for industries with relatively high use of technology (i.e., machinery, etc.) use – e.g., oil and gas extraction. Conversely, Higher labour income intensity ratios imply lower levels of technology use – e.g., Retail Trade.

The intensity ratios included in this report are appropriate to use for very general assessments of economic impacts. For more comprehensive assessments, the NWT Bureau of Statistics should be contacted to provide IO simulations using the more detailed information embodied in the IO model. As well, the Bureau of Statistics maintains current expertise in the use of IO models and multipliers, and is therefore in a position to offer guidance in the interpretation of IO results.

Using the Intensity Ratios

Below are two brief examples that demonstrate how to use the intensity ratio table contained in the report.

Example 1: Construction Industry Expansion

Intensity ratios are often used when all that is known about a project is the gross change in economic activity. For example, if there were a $50 million increase expected in the output of the territorial construction industry, then, using the intensity ratios from Table 1, the total effects (direct and indirect) would be as follows:

GDP at Basic Prices ($):   [GDP intensity ratio for Const.] x [Gross output]

                               [0.46] x [$50 million] = 23 million

Labour Income ($):   [Labour income intensity ratio for Const.] x [Gross output]

                               [0.33] x [$50 million] = 16.5 million

Employment (PYs):   ([Gross output] / [1 million]) x [Employment intensity ratio for Const.]

                               [$50 million/1 million] x [3.5] = 175

Therefore, a $50 million expected increase in the output of the construction industry has a potential GDP impact of $23.0 million; labour income impact of $16.5 million; and the potential creation of 175 person-years of employment.

It should be noted that column three of Table 1 specifies the employment intensity ratio as "Jobs per $million of output", so it is necessary to divide gross output by $1 million as part of the calculation. The intensity ratio for employment is presented this way so that its format is meaningful and consistent to that of GDP and labour income. Otherwise, 'jobs per dollar of output' would yield an intensity ratio of 0.0000035.

In the above example, the employment impact of 175 is expressed in terms of person-years of employment. This should be interpreted with caution because this could represent either 175 employees for a year, 350 half-time employees, or 700 employees for three months.

Example 2: Comparing relative economic impacts

Consider, for example, that along with the expansion in the construction industry noted above, that it is also expected that the oil and gas extraction industry will expand by $50 million, and you are interested in the relative benefits associated with each expansion. Using the intensity ratios for the oil and gas extraction industry from Table 1, the total effects (direct and indirect) would be as follows:

GDP at Basic Prices ($):   [GDP intensity ratio for Const.] x [Gross output]

                               [0.92] x [$50 million] = 46 million

Labour Income ($):   [Labour income intensity ratio for Const.] x [Gross output]

                               [0.06] x [$50 million] = 3 million

Employment (PYs):   ([Gross output] / [1 million]) x [Employment intensity ratio for Const.]

                               [$50 million/1 million] x [0.5] = 25

Therefore, a $50 million expected increase in the output of the oil and gas extraction industry has a potential GDP impact of $46 million; labour income impact of $3 million; and the potential creation of 25 person-years of employment.

In comparing the relative economic impacts of the two industrial expansions, we see that the oil and gas extraction industry has a GDP impact that is $23 million larger than the construction industry expansion. The construction industry expansion also yields $13.5 million more in labour income, and 150 more person-years of employment.

At this point, to more definitively gauge the relative economic benefits of the two expansions, one would have to consider (i) how many jobs, and associated labour income would flow to residents versus non-residents; and (ii) does the expansion impact resident businesses (which file tax returns in the NWT) in the two industries, or non-resident businesses.

Table 1 Industry Intensity Ratios – Open Model, Northwest Territories
Total Direct and Indirect Economic Impacts

	GDP at Basic Prices per Dollar of Output	Labour Income per Dollar of Output	Jobs per $million of Output
	(1)	(2)	(3)
Crop and Animal Production	1.01	0.53	8.5
Forestry and Logging	0.87	1.11	23.4
Fishing, Hunting and Trapping	0.50	0.39	15.9
Support Activities For Agriculture and Forestry	0.53	0.69	9.7
Mining and Oil and Gas Extraction	0.76	0.15	1.3
Oil and Gas Extraction	0.92	0.06	0.5
Diamond Mining	0.71	0.13	1.1
Support Activities for Mining and Oil and Gas Extraction	0.79	0.57	5.5
Utilities	0.57	0.17	1.6
Electric Power Generation, Transmission and Distribution	0.57	0.17	1.6
Natural Gas Distribution, Water, Sewage and Other Systems	0.80	0.15	2.2
Construction	0.46	0.33	3.5
Manufacturing	0.34	0.18	4.0
Wholesale Trade	0.71	0.42	6.5
Retail Trade	0.73	0.58	12.4
Transportation and Warehousing	0.45	0.30	4.1
Truck Transportation	0.55	0.44	5.7
Transit and Ground Passenger Transportation	0.65	0.47	13.7
Pipeline Transportation	0.75	0.11	1.0
Other Transportation	0.36	0.27	3.5
Warehousing and Storage	0.76	0.16	2.0
Information and Cultural Industries	0.73	0.26	4.1
Motion Picture and Sound Recording Industries	0.53	0.18	7.0
Publishing, Broadcasting and Telecommunications	0.74	0.26	3.9
Finance, Insurance, Real Estate and Renting and Leasing	0.71	0.36	2.0
Professional, Scientific and Technical Services	0.65	0.52	6.6
Administrative and Support, Waste Management and Remediation Services	0.78	0.70	10.7
Administrative and Support Services	0.77	0.73	11.3
Waste Management and Remediation Services	0.82	0.47	6.7
Educational Services	0.72	0.58	6.8
Health Care and Social Assistance	0.63	0.53	6.4
Arts, Entertainment and Recreation	0.54	0.39	13.3
Accommodation and Food Services	0.58	0.45	10.7
Other Services (Except Public Administration)	0.69	0.55	12.1
Repair and Maintenance	0.62	0.58	12.9
Grant-Making, Civic, and Professional and Similar Organizations	0.80	0.66	9.5
Personal and Laundry Services and Private Households	0.72	0.52	11.9
Government Sector	0.73	0.57	6.4
Municipal Government Services	0.64	0.47	10.7
Provincial and Territorial Government Services	0.74	0.58	6.0
Federal Government Services	0.75	0.58	5.3